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The Pendular Movement of Text Building

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Abstract

Classical theories of language concern the establishment of constituents with the purpose of describing the organisation of text within the framework of classical mechanics. The novelty in the approach presented in this article lies in a multiple dynamic pendular system that enforces a strict regime on text building behaviour. The working of this mechanism is demonstrated by means of twenty model typic examples. On the basis of these examples, it is concluded that texture and structure converge into a textual whole, that is, into a body of language.

On Conflicting Categories

Every study of language as phenomenon has to take some basic expression into consideration. Basic to the linguistic study is the unit called (a) "clause", which imposes an analysis of the logical relations of its constituent parts, or (b) "sentence", implying grammaticality, such that the parts are combined according to rules which give sense or meaning to the expression. The term "expression" is in this frame of reference used in the sense of "utterance". Thus grammaticality incorporates a syntactic as well as semantic component. Further a sentence may be simple (made up of a minimally sufficient number of parts) or complex (made up of clauses in a hierarchy of associative relations) to constitute completeness. Therefore, any grammar, whether its purpose is to state or consolidate rules of grammaticality with reference to a certain language or to describe the variability of pieces of that language in use by its speakers, is trying to systematise cases of language on the basis of at least two conflicting categories, namely syntactic fluency and semantic-logical form.

The traditional linguistic model is the Subject - Verb - Object model. The relationship between the components are as follows:

$$S \rightleftarrows V \leftarrow O \qquad (1)$$

The arrows represent two kinds of nexus. The mutual dependency between Subject and Verb indicates that, in the syntactic flow, their position restrict the position of the other. Further, semantically there is a dependency between Subject and Verb such that the action stated must be probable with reference to some intuitive knowledge of the world. This knowledge is represented by the Object, which is connected to the $S \rightleftarrows V$ by a unidirectional link. Both kinds of nexus explain the phenomenon in terms of association. This "imperative of association" (I. Bierschenk, 1984 a) has far-reaching consequences for the operationalisation of the model: (1) The object-dependent interpretation of actions and events stated decontextualises the individual component (compare Lat. subicere), and (2) the objectivity of the analysis is illusory, since it is subjected to the prerequisites of the model.

Another case of category conflict in linguistics is the supposed identity between model and theory. This is often due to the lexical meaning of "linguistic" in English. I will use linguistic when I refer to the scientific term only. Thus a linguistic model may be a model of language ("langue") or language use ("parole"), which are re-termed by Chomsky as approximately "competence" and "performance". Neither the first nor the second kind of model has the explanatory power of representing a theory of language, rather "theories of grammar", and in this sense there exists an identity because the SVO components reflect the texture of an expression. However, I will propose in this article that a theory of texture is not enough to explain verbal behaviour. Its necessary complement is a theory of structure. It is commonly assumed in grammatical theory that texture and structure are identical, but that there exists a categorical difference between surface and depth. Here we have a third example of categorical error. Depending on the links specified by the SVO the surface realisations of some depth relations are mechanical translations from a basic expression rather than transformations of it. In the following some theoretical approaches based on the SVO model will be shortly outlined.

The Texture Model

The SVO is a texture-oriented model insofar as it aims at describing the organisational aspects of language, be it based on simple or complex patterns. For modern linguistics Chomsky's Syntactic structures (1957) became the starting point for a formal-logical description of language, further developed in Aspects of the theory of syntax (1965). The basic unit is the "kernel sentence" , specified as a declarative clause. This is derived by means of a "phrase structure rule", ordering the constituents of the clause at two levels:

(1) $S \rightarrow NP + VP$
(2) $VP \rightarrow V + NP$ (2)

The hierarchy is mostly graphically presented as a binary tree diagram whose syntactic levelling can be further used in parsing syntactic complexity or "depth":

$$(NP + VP\ (V + NP)) \qquad (3)$$

for which the logical formula is a two-argument proposition:

$$v\ (NP_1, NP_2) \qquad (4)$$

From the formula it is quite evident that NP_1 corresponds to subject and NP_2 to object, so at this level of description the kernel sentence project into a declarative clause with respect to syntax and logical form. But as soon as the competence formula shall be operationalised into rules for analysing cases of performance, the problem of grammaticality arises. Therefore, in the model are introduced semantic constraints on the phrases at several description levels to account for highest possible probability in the calculation of correct grammatical outputs. Thus the grammar presupposes types of phrases, building blocks whose possible combinations in a performance sentence are restricted by competence rules.

The competence formula is the kernel of the model in its description of how types of sentences should be analysed. Thus through deletion, insertion, positional change, reduction, etc the mechanics of competence logics operates over several syntactic levels to form variability in performance, hence the term "transformation". However, a memory or some other device for conserving experience is not proposed in a TG description (Pereira & Warren, 1980). As a consequence, the formalism is capable of keeping track of the organisational properties of language but not of the structural. The use of transformation in this context is misleading (compare the American conception of transformation as transference) due to a categorical misconception of structure. Moreover, for a theory of language, this model is insignificant, because competence and performance are not kept apart in the analysis.

Fillmore's (1968) case model is an extension of the TG grammar. The kernel sentence is supposed to be represented by Modality and Proposition. By the M-constituent the kernel is more sentence- than clause-oriented. The P-constituent is a symbol for type of sentence, whose verb component constraints the range of cases possible, hence the case frame. Since the number and kind of cases may vary, as for example in the frame for 'open':

$$+\ (\_\ O\ (I)\ (A)\ ) \qquad (5)$$

the frame is a multi-argument proposition:

$$v\ (NP_1, NP_2, \ \dots\ ) \qquad (6)$$

The links between the conceptual and the syntactically manifest cases are the prepositions. By using a linear hierarchic order among them, the correct performance sentence can be analysed. The model goes only half-way, though. Because of the semantic restrictions on the NP's there is a lexical dependency built into the analysis, so that, for example

(a) John opened the door with *a key*, and (7)
(b) *The key* opened the door

are realisations of the same case, indicating an interaction between event knowledge and linguistic knowledge.

A kind of linguistic description attractive for more procedurally oriented language analysis is the "systemic grammar" outlined by Halliday (1970). It builds on combinations of features relating to two dimensions in a matrix, where one is grammatical and the other referential or situational (here called functional). By assignment of features from different facets, collocations are formed which combine to words, groups, and clause (in its variable linguistic sense). Grammaticality, i.e. the feature organisation of a clause, is determined as mutual exclusiveness by logical dependency in syntax, which means that syntactic levels are used in the analysis similar to a phrase structure grammar. But in that there is no deep structure assumed, the grammar should be conceived as a contribution to a description of language (English) usage.

The Structure Model

The structure model assumes that texture provides the necessary links to structure. The fundamental difference between the texture and structure models is not to be found in the basic expression per se, because both a clause or the combination of clauses into a sentence may project an empirical event, event relation or observation. But such a coincidence should be regarded as momentary, because the properties and relations underlying the expression are frozen, that is, those properties and relations that make up the structure. Thus, the structure concept is multivariate for which any clause- or sentence-based model is unsuitable. The structure model bears theoretically on text. Text is here conceived as a natural phenomenon, as it is produced by a human being. Accordingly, this production operates with conformity to natural law.

The following description of properties and principles of text production or "text building behaviour" rests on written text, regardless of its degree of preparation.

The Physical Properties of Text

Text building behaviour is a process which comes about in the co-operation of physical energy and flow of information, the first generated by the text producer, or agent, the second formed by the environment (I. Bierschenk, 1991). In this systemic co-operation there are natural laws at work pertaining to the physical and the informational properties of text. There is, for example, a distinction to be made between translation, which is the mechanical principle of displacement, and transformation, which is related to thermodynamics. The basic components in classical mechanics is mass, time, and length. In the following, text will be described in these mechanical terms and it will be demonstrated the way in which text mechanics have been used in the operationalisation of the structure model of analysis.

The Mass of a Text

Related to quantitative studies of language is the term "body" or "corpus". An observable corpus consists of elements of language making up the matter, which has no specific shape. Thus linguistic observation of corpora aims at developing methods for differentiation and specification within and between corpora in order to state their characteristics, such as age, weight, and beauty, or regularity, predictability, and resistance with reference to predetermined factors.

An inspection of the properties of the undifferentiated mass of a text shows that it is composed of alphabetical (including numerical) graphemes, and junctural graphemes (including spaces) between them. A text, visualised as a mass of graphemes, may look like the following example. The general character 'x' is used here to symbolise all kinds of graphematic variation except for junctural graphemes.

xx xxxxxxx xxx xxxxxx xx x xxx xxxxxxxxxxxxxxxx xxxxx , xxxx (8)
xxxxxxxxxxx xxxxx xxxxxxxx xx x xxxxx xxxxxxxxxx xxx xxxxx .

As junctural grapheme of the same type as the (,) are defined (:), (;), (-), and a list of grapheme strings functioning as junctures, such as 'and', 'if', and 'which'. Similarly, as (.) also serve (?) and (!). These junctural graphemes are named clause markers and sentence markers respectively.

The Time of a Text

Typical of the mechanics of text production is the recurrence of junctures indicating intervals in speech or writing. This is taken as indicators of time. Thus the time interval between two occurrences of sentence marker will be called a *period.*

There are rules for putting in the commas, for example, and these differ a great deal among writers of the same language and between languages. Therefore the presence of clause markers may be indicative of the energy put into the interval or of the "art" of writing. In general, they are pause markers of different length. Such a pause may be marked by either a string or a grapheme or both. When two or more markers co-occur it is taken as a longer pause similar to a period:

. xxx xxxxx xxxxxxx xx $\begin{bmatrix}\text{,which} \\ .\end{bmatrix}$ xxxxxxxxxx xxxx. (9)

It is interesting to note that there exists a natural feeling for periods, for example in transcribing spoken texts onto other media, while the marking of clauses in between by putting in commas is an activity that requires more of academic training. Further, among unskilled writers, especially young people writing essays in Swedish, there has been a tendency during the last years to mark a period instead of a comma when 'which' refers to the preceding statement as a whole. The string '. Which xxx xxxxx.' Should be replaced by '. This xxx xxxxx.' According to writing norms and conventions the example is a violation of a rule of punctuation. At the same time it shows that the natural force in writing activity must not always be obscured by these conventions.

The Length of a Text

The texture, outlined as patterned strings of graphemes has now been identified as to its geometrical properties and kinetic arrangement. In the text production process, successions of demarcations of borders can be identified by matching the patterns of strings against a small dictionary of clause and sentence markers. The demarcating properties of language constitute a closed system but their productive or energetic properties at work in text building characterise the system as self-organising and thus open to information flows.

The textual working mood is rhythmic, as are all intentional movements of individuals. I will make this statement the basis for describing the third mechanical principle, namely length. Length is connected to the dynamics per time unit and should therefore be defined as the extension of movement. This rhythmic movement of producing text is not linear but pendular. In Kugler & Turvey (1987) it has been demonstrated that the human physical system functions conform to natural laws. For that reason, it is most likely that there should be no principal difference between a typically human or individual loco(motion) schema in, for example walking, and in writing. The bones, joints, and muscles are co-ordinated for the movement to start, for its duration and for the stop of it. Likewise there is energy generated in covering a certain distance, for instance too much "work out" resulting in severe stretching or dislocation. But most often the parts work well together to form a joint action.

The dynamics in these actions is closely connected to intentionality. It is not primarily a question of reaching a certain goal, because the goal may not be known or even imagined. Intentionality is the internal potential, which strives toward self-realisation, and thus self-reference. The striving can be discerned as rhythmic movements over time. Thus there are intervals within which the mechanism is not reproductive and others where it is exuberant. For the analysis, this means that the amount of self-referential expressions is a measure of length.

In walking, the body moves the legs and arms in a mood of limited and recurrent cycles. The basic device of this pendular mechanism is a dispension point. The corresponding device in language is the verb. As a consequence, an interval which contains no verb does not express any movement and does not add anything to the analysis. Self-reference is manifest where a verb has been discerned between two marked borders, providing for the pendulum to swing. It follows that two or more successive instances of verbs require insertion of markers to demarcate the pendular array. (For the algorithmic processing, the demarcators are always clause markers.) By this measure, the elasticity of the system is accounted for.

A verb dictionary of stems and inflection endings is required, by means of which verb is defined as a finite or infinite simple string. This definition has the following important effects. Grammatically, the finite verb is the only form that can be constitutive of a clause. In the structure model it is not so. This analysis breaks up the nominalization of the infinite to get at the intentionality behind. The semantic meaning of the verb is here totally irrelevant. It is a functional constant, which co-ordinates the intentional and orientational components of the text. As will be demonstrated, coordination prerequires intentionality. In clauses with infinite verb the intentional component is to be found "behind" the clause border, that is upwards. In the same way the orientational component may be absent in the clause but be found "beyond" the border, that is downwards. Dummies (**D**) are then inserted for these variables. Therefore, the basic expression of this model of analysis is the functional clause:

$$\mathbf{D}\ \mathrm{f}\ \mathbf{D} \qquad (10)$$

As has been mentioned, the function of the verb in text building is to co-ordinate intention and orientation. It is a kind of movement controller which is of utmost importance, especially as texture is normally characterised by distortion or discontinuity while flowing. The model name of this function is the action component (a). Now, more concretely, the action is to couple textual variables of intention with textual variables of orientation on the textural surface so that the relations are conserved over time units until the end of the text. It is a kind of repairing mechanism like in stitching, when one has to pick up a ladder.

The model component of intention is Agent and of orientation it is Objective, thus AaO, which has the following relational links:

$$A \rightarrow a \rightarrow O \qquad (11)$$

The underlying theory is the Kantian schema of synthesis (Kant, 1787-1790; 1975), the modelling of which has been presented elsewhere (B. Bierschenk, 1984, 1991; Bierschenk, B., & Bierschenk, I., 1986 a, b, c). Principally the orienting agent is contained in the objective by means of his own action. James J. Gibson (1979) presupposes a co-operation of perceiver and perceived to obtain informational invariance, a theory of ecological perception founded on this schema. Central to both approaches is that the outcome of the process is dependent of the moving agent, conceived as the source of conceptualization or locomotion. It is now possible to look at text as a function of both.

The text producer (A) represents (refer to) himself by every step he takes (a) in the writing process. By inserting variables (A_1 ... A_n), called textual agents (I. Bierschenk, 1989), he takes positions vis-à-vis some environment or objective (O_1 ... O_n), which are viewed from a certain or various perspectives as he moves. There are objectives that show up near and far in the array. Some form viewpoints, some function as standpoints, others serve as functional means, that is aidpoints for the movement, and, finally, some are setpoints at the horizon.

The active verb marks that a step forward is taken. Every marked period signifies that the agent has to make a pause and a restart. This rest in the process is sometimes a way of "recovering the strength". In the text, this is shown by the insertion of an unknown A-variable, namely X as a function of higher order governing the agent. This order should be understood as a voluntary act. The same kind of perspectival shift is made by the passive verb.

The Perspective Array of the Text

Text processing is here seen as the coordination of the agent and its objectives within the perspective array. One part of this array is defined by the layout of the agents and their degree of integration, which defines the concentration of the potential. The other part of the array is determined by the layout of the objectives and their specific differentiation of potential energy.

Textural processing, that is moving psycho-physically, always implies that the flow puts the texture into perspective, which means that the objective(s) come in and go out of sight differentially depending on the moves. This flow in the optic array is acting on the moving agent and becomes integrated over time. Moreover, by shifting perspectives a disintegration comes about, differentiating the objects relative to one another in a new way. This is constitutive of the analysing - synthesising process of which every text is a representation. Example (12) is an illustration of nested interactions formed by the force-flow principle:

A→a→O >—●—< O →a (12)

Of course there are qualitative aspects of the perspectivation process in the sense that there has to be a certain internal logic in the moves of the writer in order for the reader to do the correct processing.

The Objective Component

Because of the lower concentration of the Objective component there has to be some ordering principle. Four sub components are distinguished, Figure and Ground, Means and Goal. The ecological relevance of Figure and Ground in language has been discussed earlier (I. Bierschenk, 1984 b). Their realisations in the texture are expressed as trajectories of points, such that the Figure variables are viewpoints, the Ground variables standpoints, the Means variables aidpoints and the Goal variables setpoints. These are distinguished through prepositions as pointers. For example, 'for' points towards a setpoint, 'with' *and* 'by' towards an aidpoint, and 'in', 'on', 'under', and the like towards a standpoint. There is no pointer towards a viewpoint.

Within the array of a functional clause, the theoretically determined order among the sub components are Figure, Ground, Means, Goal when all four are subsequently realised. However, characteristic of the flow is its irreversibility, which has a constraining function operating in the direction of the flow. As a consequence, Goal is of highest order constraining the information quality of the others, and so on in falling order. Example (13) illustrates this principle:

on xxxxx (1) with xxxxx (2) for xxxxx(3) (13)
with xxxxx (2) on xxxxx (2) for xxxxx (3)
for xxxxx (3) on xxxxx (3) with xxxxx (3)

The Objective must be realised with at least one point, regardless of which type. The order among the sub components is determined according to perspective vicinity. It is therefore natural that the Figure and Ground, as being necessary co-ordinates for perspectivation, are given in every text, while the Means and Goal are more related to text type. But this relation does not imply that some components are obligatory and others optional in the functional clause, it only states a quantitative relation between them. High realisation frequency corresponds to high vicinity, which in its turn implies that variables of the Figure tend to be left out on the texture more often than others. Accordingly, the Objective dummies are always translated with the nearest viewpoint in the flow.

The analysis of the Objective is a result of the verb definition. It dissolves lexicalised phrases consisting of verb + prepositional particle to allow for the natural differentiation to be discerned. Moreover, the grammatical concept of intransitive verb has no relevance to functional analysis.

The Agent Component

The higher concentration of the Agent part is expressed in two ways. Firstly, the prototypical agent is shorter in extension than the objective part of the clause. Secondly, the prepositions of the agent are integrated, that is, they are not pointers for differential analysis, only extensional markers, elaborating the special potential of the agent in question.

Most important in an analysis of the agent is its functional place compared with a grammatical. An extended discussion of this topic is to be found in I. Bierschenk (1987). The most salient property of the agent is to be governor of the action, which naturally means that its functional place in the clause, whether texturally manifest or not, is before the functionally active verb. As earlier mentioned, a perspectival shift is present by a passive verb, which has implications for the analysis of the entire perspective array. The p-shift means a backlash so that some part of the objective is given the potential of governing the movement, although this textural potential is only virtual. The p-verb has the function to guarantee that the intentional component is not lost in the trajectory. For that reason, and because this agent is unknown, the variable X is inserted at the functional place of the agent. The following examples illustrate an analysis of an active and a p-shifted clause respectively (cm = clause marker):

strings	, xxx xxx xxxx ,	(14)
lexical tagging	cm v_a cm	
analysis	xxx xxxxx A O	

strings	, xxx xxx xxxxx ,	(15)
lexical tagging	cm v_p cm	
analysis	(X)xxx xxxxx A O O	

As is shown, the objective gets its correct functional analysis irrespective of syntactic position.

One typical criterion of textual objectivity, which is required of certain official documents and in scientific writing, for example, is the passive mood of writing. This objectivity is virtual and has to do with style. Many studies of the passive construction have demonstrated that "processing time" does not differ between passive and active mood, which implies that there is no depth involved, the way it was imposed on the passive by TG grammarians (Broadbent, 1977). Thus in agreement with these findings, the agent of the p-shifted clause is not to be found "behind" the border, it is immediately processed as an inferred perspectival place holder. As a result, grammatical agents (by-phrases in final position of a passive sentence) are functionally analysed as aidpoints, that is they serve as means for perspective control.

While the X-agent of a p-shifted clause (X_p) is the outcome of an optional move from the part of the text builder, and thus may be called an environmentally or externally bound agent, there exists, quite naturally, a complement to it, namely an internally bound X-agent (X_a). Its omnipresence becomes visible at every start/restart that leaves the agent function open. Linguistically termed, these openings are found in sentences of the non-declarative type (question, imperative) and other constructions with inverted word order. The textural presence of X_a is optional, too, but is still different compared to the X_p. The difference lies in the internal constraints: When it shows up, it is the very mark of the self-referentiality in text. Whether these double X-agencies refer to the same or different quality throughout the text is a matter of research. An example of an X_a-analysis is given below (cm = clause marker, sm = sentence marker).

string . xxx xxxxxx x ? (16)
lexical
tagging sm cm v_a sm
analysis (X) x
A O

So far, two types of agents have been demonstrated, both related to the spatial dimension of the text. The textual agent represents the horizontal axis while the X-agent represents the vertical. A third type is related to the time dimension in that it rewrites the coordination of the preceding A and O into the next period. This function is carried by the dummy variable of language itself (Engl. 'it', Swed. 'det', Germ. 'es', French 'il'). Example (17) shows the rewriting.

string , xxx xx xxx . It xxx xxxxx . (17)
analysis A1 O1 A2(A1+O1) O2

The Pendulum of the Text

Every development towards a structural whole involves steps and phases of permanence and movability. For example, in the perceptual process, the dynamics of perspectivation is a matter of adjustment of angles. Objective permanence is obtained when the angle is zero. As in psycho-physics, where locomotion of the perceiver determines the quality of the perceived, text is a function of the dynamics of the pendular movement towards balance that occur when the potential weight held by the agent acts upon the gravity of the objective part. In principle, there are two states of balance in text building, one related to the spatial dimension (X - Y), the other to mass (A_n - O_n):

$X (A_n)$ a $Y (O_n)$ (18)

The unknown relation determines the dynamics of the text and when balanced the components represent the start state. The materialised relation represents the end state. The movements giving life to text occur in the co-operation of these dimensions such that angles form intersections of mass and space:

X
↓
. xx xxxx . xxx xx . (19)
D v O A v **D**
↑
Y

These formations are set in asymmetrically with individual variations from text to text. Thus within a time unit of period, those turning or folding points represented by the functional clause occur more or less frequently.

Every functional asymmetry represented in the texture implies that there is a linkage to be established to the structure. The linking mechanism provides for the conservation of structure. Therefore, the crucial device would be one which conserves energy over periods. As has been demonstrated previously, a period may start with three different potential weights, the materialised (textual) agent (A), the unknown (X) or the linguistic dummy ('it'). The first two mark that the central point of gravity lies within the border of one step. Thus at every folding point where the weight is located to the objective, the link to the agent mass is direct and is copied down over the clause border to fill the slot. This is repeated one step at a time until a balance is reached. The 'it'-dummy marks the balance obtained in the preceding step, but since it is a marker its mass is only virtual. It has the function of stepping forwards and weighing backwards, thus co-ordinating dynamics and equilibrium.

The unknown objective is a priori non-permanent. The principle for balancing the objective part is governed by backward processing. Therefore the a posteriori and the a priori converge such that the subsequent A-O relation is moved upwards to its place in time. It is like reconnoitring the ground before the step is taken. The principle difference between objective and agent swings is that more mass is bound to the objective. However, the agent represents more functional weight, since it is contained in the objective. The pendulum is the device for controlling that the dynamics of the text building moves towards an optimal co-operation of texture and structure. The following example will illustrate how the agent's functional potential reigns over the functional gravity of the textual mass, leading to functional symmetry.

. (20)
X
a
D (A + (A + O))
.
A
a
D (A + O)
,
D (A)
a
O
.
D (A)
a
Y
.

The Dynamics. Typical of the materialisation of a naturally built text is that the symmetries are broken. However, it is this law that makes it possible to look into the language space of an individual. To make it very concrete, the textural surface opens up a pattern of "peep-holes" through which one may grasp deeper embedded materia. This picking up procedure is by no means linear in kind, it is by necessity non-linear, because of the twisted movement caused by a volume flow in forward direction. Therefore, what is required by the text analyser is to translate the pendular mood of a universe into a linear representation so as to converge the structural whole with the textural. So the result of an analysis of the unbounded borderlines cannot be captured by conventional interpreters. Clearly, the dynamics of grasping and twisting in text building lies beyond what can be inferred from analysis of texture only.

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Author Notes

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